DOCUMENT RESUME

ED 160 401 SE 024 955

AUTHOR Rice, Dale W.
TITLE A List of the Marine Mammals of the World. Third Edition.
INSTITUTION National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Marine Fisheries Service.
REPORT NO NOAA-TR-NMFS-SSRF-711
PUB DATE Apr 77
NOTE 22p.; Contains occasional small type
AVAILABLE FROM Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 003-020-00134-3; $1.00)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Biological Sciences; Biology; *Geographic Distribution; *Marine Biology; *Oceanology; Scientific Research; Taxonomy; Wildlife Management; *Zoology
IDENTIFIERS *Mammals

ABSTRACT

This National Oceanic and Atmospheric Administration publication lists 116 species of living and recently extinct marine mammals of the world. Included are 36 species of Order Carnivora (polar bear, sea otter, and 34 pinnipeds); 5 species of Order Sirenia; 10 of Order Mysticeti (baleen whales); and 65 species of Order Odontoceti (tooth whales). Living freshwater pinnipeds, sirenians and cetaceans are included. Information given for listed families, genera, and species is mostly limited to distribution and literature sources where the taxonomy is described. A list of generic and specific synonyms is also provided. This publication is part of a series of technical reports for the National Marine Fisheries Service. (MR)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

711

PB-261 914

NOAA Technical Report NMFS SSRF-711

A List of the Marine Mammals of the World

Dale W. Rice

April 1977

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

SE 024 955

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

2

NOAA TECHNICAL REPORTS

National Marine Fisheries Service, Special Scientific Report—Fisheries

The major responsibilities of the National Marine Fisheries Service (NMFS) are to monitor and assess the abundance and geographic distribution of fishery resources, to understand and predict fluctuations in the quantity and distribution of these resources, and to establish levels for optimum use of the resources. NMFS is also charged with the development and implementation of policies for managing national fishing grounds, development and enforcement of domestic fisheries regulations, surveillance of foreign fishing off United States coastal waters, and the development and enforcement of international fishery agreements and policies. NMFS also assists the fishing industry through marketing service and economic analysis programs, and mortgage insurance and vessel construction subsidies. It collects, analyzes, and publishes statistics on various phases of the industry.

The Special Scientific Report—Fisheries series was established in 1949. The series carries reports on scientific investigations that document long-term continuing programs of NMFS, or intensive scientific reports on studies of restricted scope. The reports may deal with applied fishery problems. The series is also used as a medium for the publication of bibliographies of a specialized scientific nature.

NOAA Technical Reports NMFS SSRF are available free in limited numbers to governmental agencies, both Federal and State. They are also available in exchange for other scientific and technical publications in the marine sciences. Individual copies may be obtained (unless otherwise noted) from D822, Technical Information Division, Environmental Science Information Center, NOAA, Washington, D.C. 20235. Recent SSRFs are:

649. Distribution of forage of skipjack tuna (*Euthynnus pelamis*) in the eastern tropical Pacific. By Maurice Blackburn and Michael Laurs. January 1972, iii + 16 p., 7 figs., 3 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

650. Effects of some antioxidants and EDTA on the development of rancidity in Spanish mackerel (*Scomberomorus maculatus*) during frozen storage. By Robert N. Farragut. February 1972, iv + 12 p., 6 figs., 12 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

651. The effect of premortem stress, holding temperatures, and freezing on the biochemistry and quality of skipjack tuna. By Ladell Crawford. April 1972, iii + 23 p., 3 figs., 4 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

653. The use of electricity in conjunction with a 12.5-meter (Headrope) Gulf-of-Mexico shrimp trawl in Lake Michigan. By James E. Ellis. March 1972, iv + 10 p., 11 figs., 4 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

654. An electric detector system for recovering internally tagged menhaden, genus *Brevoortia*. By R. O. Parker, Jr. February 1972, iii + 7 p., 3 figs., 1 app. table. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

655. Immobilization of fingerling salmon and trout by decompression. By Doyle F. Sutherland. March 1972, iii + 7 p., 3 figs., 2 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

656. The calico scallop, *Argopecten gibbus*. By Donald M. Allen and T. J. Costello. May 1972, iii + 19 p., 9 figs., 1 table. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

657. Making fish protein concentrates by enzymatic hydrolysis. A status report on research and some processes and products studied by NMFS. By Malcolm B. Hale. November 1972, v + 32 p., 15 figs., 17 tables, 1 app. table. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

658. List of fishes of Alaska and adjacent waters with a guide to some of their literature. By Jay C. Quast and Elizabeth L. Hall. July 1972, iv + 47 p. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

659. The Southeast Fisheries Center bionumeric code. Part I: Fishes. By Harvey R. Bullis, Jr., Richard B. Roe, and Judith C. Gatlin. July 1972, xi + 95 p., 2 figs. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

660. A freshwater fish electro-motivator (FFEM): its characteristics and operation. By James E. Ellis and Charles C. Hoopes. November 1972, iii + 11 p., 2 figs.

661. A review of the literature on the development of skipjack tuna fisheries in the central and western Pacific Ocean. By Frank J. Hester and Tamio Otsu. January 1973, iii + 13 p., 1 fig. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

662. Seasonal distribution of tunas and billfishes in the Atlantic. By John P. Wise and Charles W. Davis. January 1973, iv + 24 p., 13 figs., 4 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

663. Fish larvae collected from the northeastern Pacific Ocean and Puget Sound during April and May 1967. By Kenneth D. Waldron. December 1972, iii + 16 p., 2 figs., 1 table, 4 app. tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

664. Tagging and tag-recovery experiments with Atlantic menhaden, *Brevoortia tyrannus*. By Richard L. Kroger and Robert L. Dryfoos. December 1972, iv + 11 p., 4 figs., 12 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

665. Larval fish survey of Humbolt Bay, California. By Maxwell B. Eldridge and Charles F. Bryan. December 1972, iii + 8 p., 8 figs., 1 table. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

666. Distribution and relative abundance of fishes in Newport River, North Carolina. By William R. Turner and George N. Johnson. September 1973, iv + 23 p., 1 fig., 13 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

667. An analysis of the commercial lobster (*Homarus americanus*) fishery along the coast of Maine, August 1966 through December 1970. By James C. Thomas. June 1973, v + 57 p., 18 figs., 11 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

668. An annotated bibliography of the cunner, *Tautogolabrus adspersus* (Wilbaum). By Fredric M. Serchuk and David W. Frame. May 1973, ii + 41 p. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

669. Subpoint prediction for direct readout meterological satellites. By L. E. Eber. August 1973, iii + 7 p., 2 figs., 1 table. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

670. Unharvested fishes in the U.S. commercial fishery of western Lake Erie in 1969. By Harry D. Van Meter. July 1973, iii + 11 p., 6 figs., 6 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

671. Coastal upwelling indices, west coast of North America, 1946-71. By Andrew Bakun. June 1973, iv + 103 p., 6 figs., 3 tables, 45 app. figs. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Continued on inside back cover

007424

NOAA Technical Report NMFS SSRF-711

A List of the Marine Mammals of the World (Third Edition)

Dale W. Rice

April 1977

U.S. DEPARTMENT OF COMMERCE
Juanita M. Kreps, Secretary

National Oceanic and Atmospheric Administration
Robert M. White, Administrator

National Marine Fisheries Service
Robert W. Schoning, Director

For Sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 Stock No. 003-020-00134-3

The National Marine Fisheries Service (NMFS) does not approve, recommend or endorse any proprietary product or proprietary material mentioned in this publication. No reference shall be made to NMFS, or to this publication furnished by NMFS, in any advertising or sales promotion which would indicate or imply that NMFS approves, recommends or endorses any proprietary product or proprietary material mentioned herein, or which has as its purpose an intent to cause directly or indirectly the advertised product to be used or purchased because of this NMFS publication.

CONTENTS

	Page
Introduction	1
Carnivora	2
Ursidae (1)[1]	2
Odobenidae (1)	2
Otariidae (14)	2
Mustelidae (1)	3
Phocidae (19)	4
Sirenia	5
Dugongidae (2)	5
Trichechidae (3)	6
Mysticeti	6
Eschrichtiidae (1)	6
Balaenopteridae (6)	6
Balaenidae (3)	6
Odontoceti	7
Platanistidae (5)	7
Delphinidae (37)	7
Monodontidae (2)	10
Physeteridae (3)	11
Ziphiidae (18)	11
Synonyms	12
Acknowledgments	13
Literature Cited	13

[1]Numbers in parentheses indicate number of species in each family.

A List of the Marine Mammals of the World[1]

DALE W. RICE[2]

ABSTRACT

Listed are the 116 species of Recent marine mammals, including freshwater species of the predominantly marine groups. The number of species are: Order Carnivora, 36 (polar bear, sea otter, and 34 pinnipeds); Order Sirenia, 5; Order Mysticeti, 10; and Order Odontoceti, 65. The geographic distribution of each species is indicated.

INTRODUCTION

Listed here are the living and recently extinct marine mammals of the world: the sea otter, polar bear, pinnipeds, sirenians, and cetaceans. Living freshwater pinnipeds, sirenians, and cetaceans are included.

Attempts to classify marine mammals are difficult because they are poorly known. Some live on the high seas and others on remote oceanic islands or among polar ice fields. Some sirenians and smaller cetaceans live in tropical waters seldom visited by mammalogists. The carcasses of marine mammals are large, greasy, bloody, and often putrefied before they are brought to the attention of biologists. They are difficult and expensive to collect and to preserve for study. As a result, some kinds are represented in scientific collections by only a few skulls and their external appearance is poorly known. Thus, any list of the marine mammals, especially of the smaller cetaceans, can be regarded only as provisional.

The seals have usually been separated from the terrestrial carnivores as Order (or Suborder) Pinnipedia. It is now clear, however, that the pinnipeds had a common origin with the weasel, racoon, dog, and bear families, and together they constitute one of the two main subdivisions of living carnivores (Mitchell and Tedford 1973).

The cetaceans have usually been regarded as comprising a single order, but their origins are obscure, and it is questionable whether they are monophyletic. The Odontoceti (toothed whales) and the Mysticeti (baleen whales) have been separate since at least the late Eocene, and all authors have recognized them as valid taxa at either the subordinal or ordinal level. The differences between the two groups are as great as those between some of the universally recognized orders of mammals (Rice, in Anderson and Jones 1967). Therefore I follow Kleinenberg (1958) and some other authors in ranking them as separate orders.

In the Order Odontoceti, the species of the genera *Platanista*, *Sousa*, *Sotalia*, and *Tursiops* herein recognized as valid have been changed to conform to the "List of Smaller Cetaceans Recognized," agreed upon at the special meeting on smaller cetaceans held by the Scientific Committee of the International Whaling Commission (1975). The present list now agrees with the IWC Scientific Committee's list. It appears that the specific classification of the Odontoceti is approaching a consensus. Future studies may indicate that certain closely related allopatric forms now listed as separate species should be regarded as conspecific; such cases are noted in the text. Recent studies on some species of small cetaceans (e.g., *Stenella longirostris* and *S. attenuata*) have revealed considerable geographic variation. Most species of cetaceans are still too poorly known for subspecies to be defined, but I have listed the proposed subspecies that appear to be valid.

In the few cases where the nomenclature or classification in the present list differs from that in the working list compiled by the U.S. Marine Mammal Commission (1976), the reasons are explained in the text or in the references cited therein.

The following names are senior synonyms of names used in this list; according to Article 23b of the International Code for Zoological Nomenclature (International Trust for Zoological Nomenclature 1964), these names are nomina oblita and cannot replace the names herein employed:

Stenorhinchus E. Geoffroy St.-Hilaire and F. Cuvier, 1826 (= *Hydrurga* Gistel, 1848)
Susu Lesson, 1828 (= *Platanista* Wagler, 1830)
Nodus Wagler, 1830 (= *Mesoplodon* Gervais, 1850)
Tursiops nesarnack (Lacépède, 1804) [= *T. truncatus* (Montagu, 1821)]
Phoca vitulina stejnegeri Allen, 1902 (= *Phoca vitulina kurilensis* Inukai, 1942)
Hyperoodontidae Gray, 1846 (= Ziphiidae Gray, 1865).

Synonyms commonly used in recent literature are listed on page 12; see Scheffer (1958) for synonymy of pinnipeds and Hershkovitz (1966) for synonymy of cetaceans.

Vernacular names are included for most species. In selecting vernacular names, I have been guided, but not bound, by the principles adopted by the American Fisheries Society's Committee on Names of Fishes

[1] A revision of two earlier lists under the same title (Scheffer and Rice 1963; Rice and Scheffer 1968).

[2] Marine Mammal Division, Northwest Fisheries Center, National Marine Fisheries Service, NOAA, Seattle, WA 98115.

(Bailey et al. 1970) and the American Ornithologists' Union's Committee on Classification and Nomenclature (1973). Many small cetaceans lack distinctive vernacular names; hence some names listed here are "book" names. I am not attempting to "standardize" vernacular names—the time is not ripe for that. I hope that field workers will record or invent more appropriate names where needed.

The report deals only with the Recent marine mammals. Readers interested in fossil forms are referred to the following publications: Winge (1921); Miller (1923); Kellogg (1928, 1936); Slijper (1936); Simpson (1945); Piveteau (1958, 1961); Reinhart (1959); Matthes (1962); King (1964); and Romer (1966).

Order CARNIVORA

The living carnivores comprise two superfamilies—Feloidea (mongooses, cats, hyenas, etc.) and Canoidea (dogs, bears, raccoons, weasels, seals, etc.) (Mitchell and Tedford 1973). Only the latter superfamily includes marine species.

Family URSIDAE

There are five living genera of bears and giant pandas (Hendey 1972), but only one contains a marine species.

Genus URSUS Linnaeus, 1758

Only one of the four species of this genus is marine.

Ursus maritimus Phipps, 1774 (polar bear).
Ice-covered regions of Arctic Ocean and contiguous seas, and adjacent coasts and islands.

Family ODOBENIDAE

Mitchell (1975) regarded the walruses as a subfamily of the Otariidae, whereas Repenning (1975) maintained them as a separate family. Pending a consensus, I follow most previous authors in listing them as a separate family.

Genus ODOBENUS Brisson, 1762

Odobenus rosmarus (Linnaeus, 1758) (walrus).
Shallow waters near ice in the Arctic Ocean and adjacent seas. Three subspecies are currently recognized: *O. r. rosmarus* in the Atlantic-Arctic; *O. r. divergens* (Illiger, 1815), in the Pacific-Arctic; and *O. r. laptevi* Chapskii, 1940, in the Laptev Sea. The Atlantic subspecies contains two breeding groups, one from the Kara Sea to eastern Greenland and another from western Greenland and eastern Canada. The latter population may be subspecifically distinct. There are late Pleistocene to prehistoric records as far south as California, Michigan, North Carolina, and France (Repenning, pers. commun.).

Family OTARIIDAE

Genus PHOCARCTOS Peters, 1866

Phocarctos hookeri (Gray, 1844) (Auckland sea lion; New Zealand sea lion).
Subantarctic islands south of New Zealand; breeds regularly only at Carnley Harbor and Enderby Island in the Auckland Islands, rarely at Campbell Island. Hauls out on Snares Islands, Macquarie Island, and South Island, N.Z. Occurred on North Island, N.Z., less than 1,000 yr ago. For discussion of the relationships of *Phocarctos*, *Neophoca*, and *Zalophus* see King (1960).

Genus OTARIA Péron, 1816

Otaria flavescens (Shaw, 1800) (South American sea lion).
Coastal waters from Recife das Tôrres, Brazil, and Zorritos, Peru, southward to Strait of Magellan and Falkland Islands. Some authors have used the specific name *byronia* de Blainville, 1820, but P. Hershkovitz pointed out (pers. commun.) that "the type of *flavescens* was a tangible specimen preserved in the old Leverian museum. It was adequately described and figured, is perfectly identifiable, and has a valid type locality. Its name has priority, usage and currency."

Genus ZALOPHUS Gill, 1866

Zalophus californianus (Lesson, 1828) (black sea lion; California, Japanese, and Galapagos sea lions).
One subspecies, *Z. c. californianus*, breeds from San Miguel Island, Calif., south to Punta Entrada, Baja California, and on islands in the upper Gulf of California, ranging at sea north to Vancouver Island, south to Cabo San Lucas and Mazatlán. A second subspecies of unconfirmed validity, *Z. c. japonicus* (Peters, 1866), was known from the Sea of Japan but was probably exterminated in the 1950's (International Union for Conservation of Nature and Natural Resources 1972; Nichiwaki 1973). A third subspecies, *Z. c. wollebaeki* Sivertsen, 1953, breeds on the Galápagos Islands.

Genus NEOPHOCA Gray, 1866

Neophoca cinerea (Péron, 1816) (Australian sea lion).
Coastal waters from Kangaroo Island, South Australia, to Houtman Rocks, Western Australia. There is a late Pleistocene record from Melbourne, Victoria.

Genus EUMETOPIAS Gill, 1866

Eumetopias jubatus (Schreber, 1776) (northern sea lion).

Breeds along west coast of North America from San Miguel Island, Calif., northwest to Prince William Sound and the Alaska Peninsula, throughout the Aleutian and Pribilof islands, along the east coast of Kamchatka, throughout the Kuril Islands, and on islands in the Okhotsk Sea. Some move north into the Bering Sea in summer, as far as St. Lawrence Island. Sometimes hauls out on ice. The spelling of *jubatus* follows a rule in International Trust for Zoological Nomenclature (1964:31): "a noun of variable gender . . . is to be treated as masculine . . . ."

Genus CALLORHINUS Gray, 1859

Calorhinus ursinus (Linnaeus, 1758) (northern fur seal).

Breeds on Ostrov Tyuleniy (Robben Island) in the Okhotsk Sea, some of the Kuril Islands, the Pribilof and Commander islands in the Bering Sea, and San Miguel Island off southern California. Formerly bred on Ostrov Iony in the Okhotsk Sea 120 miles north of Sakhalin (Stejneger 1898), and possibly on Buldir Island in the Aleutians (Murie 1959) and the Farallon Islands off central California (Repenning et al. 1971). Bones, including those of young pups, from San Miguel Island, the Monterey area, and Año Nuevo Point, Calif., and from Bella Bella, British Columbia, suggest that it formerly bred all along the west coast from San Miguel Island to Alaska (Repenning, pers. commun.).

Genus ARCTOCEPHALUS E. Geoffroy Saint-Hilaire and F. Cuvier, 1826

The breeding ranges of the species of *Arctocephalus* are strictly allopatric; further studies on the relationships of these seals are much needed. The present classification follows Repenning et al. (1971).

Arctocephalus pusillus (Schreber, 1776) (Giant fur seal; Victorian, or Tasmanian, and South African, or Cape, fur seals).

There are two widely separated subspecies. *Arctocephalus p. pusillus* breeds in temperate coastal waters from Cape Cross, South West Africa, to Algoa Bay, South Africa; ranges north to Angola. *Arctocephalus p. doriferus* Wood Jones, 1925, breeds along the coast of southeastern Australia from Lady Julia Percy Island east to the Skerries, Victoria, including coasts of Tasmania and islands in Bass Strait; ranges east to Port Stephens, N.S.W.

Arctocephalus gazella (Peters, 1875) (Antarctic fur seal).

Islands south of the Antarctic Convergence; South Shetlands, South Orkneys, South Sandwich, South Georgia, Bouvet, Kerguelén (not breeding), Heard, and McDonald.

Arctocephalus forsteri (Lesson, 1828) (Antipodean fur seal; Western Australian and New Zealand fur seals).

Breeds around South Island, N.Z., on nearby subantarctic islands (Chatham, Bounty, Antipodes, Auckland, Campbell, Macquarie, Snares, Stewart, and Solander), and along coast of southwestern Australia from Eclipse Island, Western Australia, to Kangaroo Island, South Australia.

Arctocephalus tropicalis (Gray, 1872) (subantarctic fur seal).

Subantarctic islands of Atlantic Ocean and Indian Ocean, north of the Antarctic Convergence (Tristan da Cunha, Gough, Marion, Prince Edward, Crozet (not breeding), Amsterdam, and St. Paul). Rarely wanders to South Africa, New Zealand, and Macquarie Island.

Arctocephalus australis (Zimmerman, 1783) (South American fur seal).

Falkland Islands; coasts of South America from Tierra del Fuego north to Rio de Janeiro, Brazil, and Lima, Peru. The proposed subspecific separation of the Falkland Islands and mainland populations is not justifiable (Vaz Ferreira 1976).

Arctocephalus galopagoensis Heller, 1904 (Galapagos fur seal).

Confined to the Galápagos Islands.

Arctocephalus philippii (Peters, 1866) (Juan Fernandez fur seal).

Now known to breed only on the Islas Juan Fernandez, Chile. Probably bred formerly on Isla San Felix and Isla San Ambrosio, Chile.

Arctocephalus townsendi Merriam, 1897 (Guadalupe fur seal).

Now known to breed only on Isla Guadalupe, Baja California. Occasionally seen on other islands off southern California and Baja California (San Miguel, San Nicholas, and Cedros), where it may have bred formerly. An old sealer's report from Isla Socorro (Morrell 1832) and bones from an Indian midden on Monterey Bay (Repenning, pers. commun.) suggest that it originally ranged more widely.

Family MUSTELIDAE

This family includes the weasels, badgers, otters, and their allies. Only the otters (subfamily Lutrinae) include marine species and only the sea otter is usually regarded as marine, although several species of river otters of the genus *Lutra*—especially the chungungo, *L. felina* (Molina, 1782), of Chile and Peru—feed extensively in salt water.

Genus ENHYDRA Fleming, 1822

Enhydra lutris (Linnaeus, 1758) (sea otter).
Formerly ranged from Morro Hermoso, Baja California, north along the coast to Prince William Sound and the south shore of the Alaska Peninsula, throughout the Aleutian, Pribilof, and Commander islands, along the southeast coast of Kamchatka, and through the Kuril Islands to northern Hokkaido. Three subspecies are recognizable (Roest 1973; Davis and Lidicker 1975): *E. l. nereis* (Merriam, 1904) from Mexico to Prince William Sound, Alaska; *E. l. lutris* from the Aleutian and Commander islands; and *E. l. gracilis* (Bechstein, 1799) in Kamchatka and the Kuril Islands. (The Aleutian race has been introduced into Oregon, Washington, British Columbia, and southeastern Alaska, where the indigenous stock was extirpated.)

Family PHOCIDAE

Genus PHOCA Linnaeus, 1758

Scheffer (1958) raised *Pusa* (including *hispida*, *caspica*, and *sibirica*), *Pagophilus* (*groenlandicus*), and *Histriophoca* (*fasciata*) to generic rank, but Burns and Fay (1970) have shown that they deserve only subgeneric rank.

Phoca vitulina Linnaeus, 1758 (harbor seal).
Shores of North America and Eurasia from Hokkaido, Baja California, North Carolina, and Spain north to the edge of arctic ice. Gives birth on land in May-August; the pup sheds its white coat in utero. The Atlantic subspecies, *P. v. vitulina*, is distinguishable from the Pacific subspecies by skull characters. Western North Atlantic seals are sometimes listed as a separate subspecies from those on the eastern side, but Doutt (1942) could find no differences between seals of the eastern and western Atlantic. *Phoca v. mellonae* Doutt, 1942, is said to be confined to the Seal Lakes complex of the Ungava Peninsula, though Mansfield (1967) doubted the validity of the subspecies. *Phoca v. richardii* (Gray, 1864) occurs in the eastern North Pacific west to the Aleutians, where it intergrades with *P. v. kurilensis* Inukai, 1942, of the western North Pacific (Shaughnessy 1974).

Phoca largha Pallas, 1811 (spotted seal; larga seal).
Chukchi, western Beaufort, northern Bering, Okhotsk, and Japan seas, southwest to the Shantung Peninsula, China. Reproductively isolated from *P. vitulina*, with which it is sympatric in the Kuril Islands and along the north shore of the Alaska Peninsula (Belkin 1964; McLaren 1966; Burns 1970). Gives birth on ice in late winter or spring and the pup retains its white coat for a week or more after birth.

Phoca hispida Schreber, 1775 (ringed seal).
Throughout the Arctic Ocean and adjacent seas, chiefly in fast ice, and in several Finnish lakes. Four geographically isolated peripheral populations are fairly well-defined subspecies, one each from the Okhotsk Sea (*P. h. ochotensis* Pallas, 1811); the Baltic Sea (*P. h. botnica* Gmelin, 1788); Lake Ladoga (*P. h. ladogensis* Nordquist, 1899); and Lake Saimaa and adjacent lakes (*P. h. saimensis* Nordquist, 1899). Geographical variation in the Arctic Ocean and Bering Sea populations, tentatively referable to the nominate subspecies, requires much further study.

Phoca sibirica Gmelin, 1788 (Baikal seal).
Only in Lake Baikal, U.S.S.R., a freshwater body which freezes in winter.

Phoca caspica Gmelin, 1788 (Caspian seal).
Only in Caspian Sea, U.S.S.R., the northern end of which freezes in winter.

Phoca groenlandica Erxleben, 1777 (harp seal).
North Atlantic Ocean, in pack ice from northern shores of Europe to eastern Canada. Breeds on pack ice in three main areas: the White Sea, north of Jan Mayen, and Newfoundland. (The Newfoundland seals breed in two centers: the "Front" north of the island and the "Gulf" west of it.) Seals of the three areas differ in size, cranial features, and body coloration (Khuzin 1963, 1967; Yablokov and Sergeant 1963; Yablokov and Etin 1965). Subspecific names have been given to the Newfoundland stock, *P. g. groenlandica*, and that of the White Sea, *P. g. oceanica* Lepechin, 1778, but not to the Jan Mayen stock (Smirnov 1927).

Phoca fasciata Zimmermann, 1783 (ribbon seal).
North Pacific Ocean, chiefly in pack ice, from northern Hokkaido and the Okhotsk Sea to northwestern Alaska.

Genus HALICHOERUS Nilsson, 1820

Halichoerus grypus (Fabricius, 1791) (gray seal).
Temperate coasts of the North Atlantic. There are three breeding populations: one in the western Atlantic from Newfoundland to Massachusetts, another in the eastern Atlantic from the British Isles (rarely France) and Iceland to the White Sea, and a third in the Baltic Sea. Seals of the western Atlantic and Baltic populations pup in February and March, seals of the eastern Atlantic from September to December.

Genus ERIGNATHUS Gill, 1866

Erignathus barbatus (Erxleben, 1777) (bearded seal).
Circumboreal at edges of ice; along all coasts and islands of northern Eurasia and northern North America. No subspecies are recognizable (Kosygin and Potelov 1971).

Genus CYSTOPHORA Nilsson, 1820

Cystophora cristata (Erxleben, 1777) (hooded seal; bladdernose seal).

North Atlantic Ocean at edges of ice from Novaya Zemlya to eastern Canada. Jan Mayen, Newfoundland, and Davis Strait breeding stocks are perhaps distinct.

Genus MONACHUS Fleming, 1822

Monachus monachus (Hermann, 1779) (Mediterranean monk seal).

The original range included the southern and western coasts of the Black Sea, the coasts and islands of the Mediterranean Sea, the coast of northwestern Africa southwestward to Cape Blanc, Mauritania, and the Madeira and Canary islands. Now rare or extirpated throughout much of its range.

Monachus tropicalis (Gray, 1850) (Caribbean monk seal; West Indian monk seal).

Extinct (K. W. Kenyon, pers. commun.). In historic times its range included shores and islands of the western Caribbean Sea, the Greater Antilles, the northern Lesser Antilles, the Bahamas, the Yucatan Peninsula, and the Florida Keys. In prehistoric times ranged north to South Carolina.

Monachus schauinslandi Matschie, 1905 (Hawaiian monk seal).

Breeds on Leeward Chain of the Hawaiian Islands, from French Frigate Shoals to Kure Atoll; rarely wanders southeastward to Hawaii and south to Johnston Island.

Genus LOBODON Gray, 1844

Lobodon carcinophagus (Hombron and Jacquinot, 1842) (crabeater seal).

Crabeaters are circumpolar and abundant in pack ice of the Southern Ocean; they straggle to southern tips of New Zealand, Australia, Tasmania, South Africa, and South America.

Genus OMMATOPHOCA Gray, 1844

Ommatophoca rossii Gray, 1844 (bigeye seal; Ross seal).

Circumpolar in pack ice of Antarctic Ocean.

Genus HYDRURGA Gistel, 1848

Hydrurga leptonyx (de Blainville, 1820) (leopard seal).

Leopard seals are circumpolar in the Southern Ocean and are recorded from most subantarctic islands, as well as New Zealand, southern Australia, the Cook Islands, southern South America, and South Africa.

Genus LEPTONYCHOTES Gill, 1872

Leptonychotes weddelli (Lesson, 1826) (Weddell seal).

Circumpolar in fast ice around Antarctica, south to lat. 80°S in the Bay of Whales; straggling to subantarctic islands and as far north as Uruguay, lat. 35°S.

Genus MIROUNGA Gray, 1827

Mirounga leonina (Linnaeus, 1758) (southern elephant seal).

Circumpolar on subantarctic islands, south to edges of ice at lat. 78°S. The southern elephant seal breeds along a continental coast only at Argentina. Three subspecies have been proposed, one from the South American sector of the range, one from the southern Indian Ocean sector, and one from the New Zealand sector (Lydekker 1909). They may be valid, but further study is required before they can be accepted.

Mirounga angustirostris (Gill, 1866) (northern elephant seal).

Breeds from the Farallon Islands, Calif., south to Isla Guadalupe and Islas San Benito, Baja California. Formerly from Point Reyes, Calif., south to Cabo San Lázaro, Baja California. Ranges at sea north to southeastern Alaska.

Order SIRENIA

Family DUGONGIDAE

Genus DUGONG Lacépède, 1799

Dugong dugon (Müller, 1776) (dugong).

In tropical bays and estuaries of the Indian and western Pacific oceans from Lourenço Marques, Mozambique, and the Red Sea, east to the Ryukyu Islands (Amami Oshima), Palau, the Solomon Islands, the New Hebrides, New Caledonia, the Fiji Islands, and northern Australia. Carter et al. (1945) listed it from the Marshall Islands; if it ever occurred there it no longer does so. Now rare in all its range except along northern Australia.

Genus HYDRODAMALIS Retzius, 1794

Hydrodamalis gigas (Zimmermann, 1780) (great northern sea cow; Steller's sea cow).

Discovered in the Commander Islands in 1741, the sea cow was exterminated by Russian hunters about 1768. In historic time, it lived only on Bering and Copper islands and its total population probably did not exceed 1,000 or 2,000 animals. A rib was found on Attu, the westernmost Aleutian Island, in 1842 or 1843, by Ilia G. Wosnesenski. "There is no indisputable evidence of its ever having inhabited other coasts than those of the Commander Islands, as the find of a rib on Attu Island does not necessarily

prove that the animal once lived there, though that is not improbable" (Stejneger 1897). A skull fragment about 19,000 yr old was dredged from the sea floor off Monterey, Calif. (Jones 1967). Remains have also been recovered from Pleistocene deposits on Amchitka in the Aleutian Islands (Gard 1972). Recent rumors (Berzin et al. 1963) of living sea cows near Cape Navarin, Siberia, have been discredited.

Family TRICHECHIDAE

Genus TRICHECHUS Linnaeus, 1758

Three allopatric species are recognized (Hatt 1934), but their status needs confirmation.

Trichechus manatus Linnaeus, 1758 (Caribbean manatee; West Indian manatee).

Two doubtfully valid subspecies have been described: *T. m. manatus* from the sea coast, and lower reaches of rivers, from Bay of Campeche, Mexico, to northeastern South America, and in the Bahamas and the Greater Antilles; and *T. m. latirostris* (Harlan 1824) from the coast and coastal rivers of United States from Beaufort, N.C., to Florida Keys and coast of Gulf of Mexico, westward to mouth of Rio Grande.

Trichechus senegalensis Link, 1795 (West African manatee).

Coastal lagoons and the lower reaches of rivers from Sénégal to the Cuanza River, Angola, and in the Niger and Benue drainages of Nigeria.

Trichechus inunguis (Natterer, 1883) (Amazon manatee).

Rivers of northeastern South America, particularly the Amazon and Orinoco systems.

Order MYSTICETI

Family ESCHRICHTIIDAE

Genus ESCHRICHTIUS Gray, 1864

Eschrichtius robustus (Lilljeborg, 1861) (gray whale).

Shallow coastal waters of the North Pacific. There are two stocks, one on the eastern side from the Gulf of California to the Chukchi and Beaufort seas, another on the western side from Korea and Japan to the Okhotsk Sea; the latter stock is nearly extinct. Formerly in the North Atlantic.

Family BALAENOPTERIDAE

Genus BALAENOPTERA Lacépède 1804

Balaenoptera acutorostrata Lacépède, 1804 (minke whale).

Widely distributed in all oceans. Three subspecies are recognizable: *B. a. acutorostrata* in the North Atlantic, *B. a. davidsoni* Scammon, 1872, in the North Pacific, and *B. a. bonaerensis* Burmeister, 1867, in the Southern Hemisphere (Omura 1975). Specimens from Ceylon have also been described as a separate subspecies, *B. a. thalmaha* Deraniyagala, 1963, but its validity requires confirmation.

Balaenoptera edeni Anderson, 1878 (Bryde whale).

Tropical and warm temperate waters of the Atlantic, Indian, and Pacific oceans.

Balaenoptera borealis Lesson, 1828 (sei whale).

All oceans except tropical and polar seas. Two subspecies distinguished: a smaller one, *B. b. borealis*, in the Northern Hemisphere and a larger one, *B. b. schlegellii* Flower, 1865, in the Southern Hemisphere.

Balaenoptera physalus (Linnaeus, 1758) (fin whale).

All oceans, but rarely in tropical waters or among pack ice. Two subspecies are recognized: a smaller Northern Hemisphere form, *B. p. physalus*, and a larger Southern Hemisphere form, *B. p. quoyi* (Fischer, 1829).

Balaenoptera musculus (Linnaeus, 1758) (blue whale).

All oceans. Three subspecies are recognized: a small one, *B. m. musculus*, in the North Atlantic and North Pacific; a large one, *B. m. intermedia* Burmeister, 1871, that spends the summer in Antarctic waters; and a pygmy subspecies, *B. m. brevicauda* Ichihara, 1966, in the southern Indian Ocean. (The name *B. m. brevicauda*, published by Zemsky and Boronin 1964, is a nomen nudum according to van Bree, pers. commun.; the first valid publication of the name was by Ichihara 1966.) The taxonomic status of blue whales off the coasts of Chile and Peru and in the northern Indian Ocean is not settled.

Genus MEGAPTERA Gray, 1846

Megaptera novaeangliae (Borowski, 1781) (humpback whale).

Nearly worldwide; winters largely in tropical waters near islands or the coast, summers in temperate and subpolar waters. This species shows little or no geographical variation in size; the several discrete populations differ in the frequency of color variations.

Family BALAENIDAE

Genus BALAENA Linnaeus, 1758

Some authors place *glacialis* in a separate genus, *Eubalaena* Gray, 1864. Eschricht and Reinhardt (1861), the only authors who have made a detailed comparison between *mysticetus* and *glacialis*, regarded them as congeneric. Gray's generic name was ignored by virtually all subsequent authors until it was resurrected by Allen

(1908). Gray and Allen were two of the most notorious generic "splitters" in the history of mammalogy (cf. Simpson 1961:139). The differences between the two species are no greater than those separating, e.g., the various species of *Balaenoptera*.

Balaena glacialis Müller, 1776 (right whale; black right whale).

Temperate waters of the North Atlantic, the North Pacific, and the Southern Hemisphere. The southern populations are distinguishable as a separate subspecies (or species, according to some authors), *B. g. australis* Desmoulins, 1822, from *B. g. glacialis* of the North Atlantic (Muller 1954); North Pacific populations are apparently identical to those of the North Atlantic (Omura et al. 1969).

Balaena mysticetus Linnaeus, 1758 (bowhead whale; Arctic right whale).

Arctic waters. There are four geographically isolated populations: 1) From Spitzbergen west to east Greenland; 2) in Davis Strait, Baffin Bay, James Bay, and adjacent waters; 3) in the Bering, Chukchi, and Beaufort seas; and 4) in the Okhotsk Sea. The Alaskan Eskimo recognize two kinds: the larger "kairalik" or true bowhead, and the smaller "ingotok" (known as the "poggy" to the 19th century American whalers). I believe that the ingotok is most likely a young bowhead.

Genus CAPEREA Gray, 1864

Caperea marginata (Gray, 1846) (pygmy right whale).

Temperate waters of Southern Ocean; known mostly from strandings on New Zealand, Australia, South America, the Falkland Islands, and South Africa.

Order ODONTOCETI

In recent years, several new family classifications of the odontocetes have been proposed (Fraser and Purves 1960; Nishiwaki 1963; Kasuya 1973). I believe that insufficient evidence has been published to support the validity of these classifications and that much more study is needed before any changes will be generally accepted. I therefore follow tradition in regarding the living odontocetes as divisible into five families.

Family PLATANISTIDAE

This family includes three well-marked subfamilies (which are sometimes accorded family rank): Platanistinae (*Platanista*), Iniinae (*Inia, Lipotes*), and Pontoporiinae (*Pontoporia*).

Genus INIA d'Orbigny, 1834

Inia geoffrensis (de Blainville, 1817) (bouto; Amazon dolphin).

Amazon and Orinoco basins of South America. *Inia g. boliviensis* d'Orbigny, 1834, of the upper Madeira River system in Bolivia differs considerably from *I. g. geoffrensis* in the remainder of the Amazon basin and may be a distinct species (van Bree and Robineau 1973; van Bree, pers. commun.). The population in the Orinoco basin may also be subspecifically distinct.

Genus LIPOTES Miller, 1918

Lipotes vexillifer Miller, 1918 (pei c'hi; whitefin dolphin).

Lower Yangtze River from its mouth (Shanghai) upstream to Tung-t'ing Hu (Lake) and its tributaries. The English name "whiteflag" dolphin is based on an erroneous interpretation of the Chinese (M. Nishiwaki, pers. commun.).

Genus PONTOPORIA Gray, 1846

Pontoporia blainvillei (Gervais and d'Orbigny, 1844) (franciscana; La Plata dolphin).

Coastal waters and estuaries of eastern South America, from Baia de Santos, Brazil, to Golfo San Matias, Argentina.

Genus PLATANISTA Wagler, 1830

The two allopatric forms of this genus are regarded as subspecifically distinct by Kasuya (1972) and as specifically distinct by Pilleri and Gihr (1971). I tentatively list them as separate species on the advice of van Bree (pers. commun.).

Platanista gangetica (Roxburgh, 1801) (Ganges susu; Ganges dolphin).

Ganges-Brahmaputra-Meghna river system of India, Bangladesh, and Nepal, from tidal limits to the foothills. It is presumably this species that formerly occurred in the Karnaphuli River.

Plantanista minor Owen, 1853 (Indus susu; Indus dolphin).

Indus River system of Pakistan and India, from tidal limits to the foothills. (Most authors have used the name *P. indi* Blyth, 1859, but Owen's name has priority.)

Family DELPHINIDAE

Basic references on the classification of the Delphinidae are Flower (1883) and True (1889). The true porpoises (*Phocoena, Neophocaena*, and *Phocoenoides*) constitute a well-marked group that is sometimes accorded family rank (Phocoenidae). The remainder of the family has been variously subdivided or divided.

Genus STENO Gray, 1846

Steno bredanensis (Lesson, 1828) (rough-toothed dolphin.)

All tropical and warm temperate seas.

Genus SOUSA Gray, 1866

Sousa chinensis (Osbeck, 1765) (Indo-Pacific humpback dolphin; white dolphin).

Coastal waters of the Indian and western Pacific oceans, from Port Elizabeth, South Africa, north to the Red Sea and east to southern China (including lower reaches of the Yangtze, Foochow, and Canton rivers), Borneo, and northeastern and eastern Australia. The taxonomy of the humpbacked dolphins is greatly in need of revision. Several nominal species have been described, but individual, sexual, age, and geographic variations have not been adequately studied.

Sousa teuszii (Kükenthal, 1892) (Atlantic humpback dolphin).

Coastal waters of west Africa from Mauritania to Cameroon. This form could perhaps be regarded as a subspecies of *S. chinensis*, from which it differs mainly in tooth count (26-29 versus 32-36).

Genus SOTALIA Gray, 1866

Further taxonomic studies of this genus are needed. Two forms are recognized—one chiefly in coastal and estuarine waters, the other in fresh water. The differences between them are slight; they are best regarded as subspecies of a single species. (The Old World species formerly placed in *Sotalia* are now placed in a separate genus, *Sousa*.)

Sotalia fluviatilis (Gervais, 1853) (tucuxi; tookashee).

Sotalia f. fluviatilis occurs in the Amazon River and its tributaries; *S. f. guianensis* (van Beneden, 1864) occurs in coastal waters and lower reaches of rivers of northeastern South America, from Lake Maracaibo, Venezuela, to Santos, Brazil.

Genus TURSIOPS Gervais, 1855

Tursiops truncatus (Montagu, 1821) (bottlenose dolphin).

Widely distributed in temperate and tropical waters, including the Black Sea. Occurs mostly close to shore, near islands, and over shallow banks. Ranges north to Japan, Hawaii, California, New Brunswick, and Norway; south to southern Australia, New Zealand, Chile, Argentina, and South Africa. There is considerable geographical variation; populations in warmer waters of the Indo-Pacific tend to average smaller in body size and greater in snout length and tooth count.

Genus STENELLA Gray, 1866

The species of this genus fall into three groups or superspecies which are sympatric in many areas: 1) The spinner dolphins with long snouts, about 50 teeth in each jaw, and shallow palatal grooves. This group includes forms that differ markedly in body form and color pattern, but intermediate populations connect the extreme forms, so they are regarded as conspecific (Perrin 1972, 1975a, b). Current studies indicate, however, that there is probably another species in the Atlantic similar to, but sympatric with, the spinner dolphin (Perrin, pers. commun.). 2) The spotted and bridled dolphins with shorter snouts, about 37 teeth in each jaw, and no palatal grooves. This group apparently includes two species, the ranges of which overlap in the Atlantic (Perrin 1975b). 3) The striped dolphins, with about 44 teeth in each jaw, no palatal grooves, a dark stripe along the flank, and no spots. Only one species is recognized (Fraser and Noble 1970).

Stenella longirostris (Gray, 1828) (spinner dolphin).

Tropical Atlantic, Indian, and Pacific oceans. This species shows marked geographical variation. In the central and eastern Pacific, Perrin (1972, 1975a, b) has described four subspecies: "Costa Rican," "eastern," "whitebelly," and "Hawaiian"—the correct scientific names of which have not been determined. [Although most recent authors have used Gray's specific name, its applicability is questionable (Perrin 1975b).]

Stenella attenuata (Gray, 1846) (bridled dolphin; pantropical spotted dolphin).

Tropical Atlantic, Indian, and Pacific oceans. This species also shows considerable geographical variation. In the central and eastern Pacific, Perrin (1970, 1975a, b) has described three subspecies: "coastal" *S. a graffmani* (Lönnberg, 1934), "offshore," and "Hawaiian"; the correct scientific names of the latter two have not been determined. [For the spotted dolphins I provisionally use the specific names employed by most recent authors, although their validity is dubious. Other available names are *S. dubia* (G. Cuvier, 1812) and *S. frontalis* (G. Cuvier, 1829).]

Stenella plagiodon (Cope, 1866) (spotted dolphin; Atlantic spotted dolphin).

Tropical and warm temperate waters of Atlantic Ocean. (See nomenclatorial note under preceding species).

Stenella coeruleoalba (Meyen, 1833) (striped dolphin).

Widely distributed in temperate and tropical waters around the world.

Genus DELPHINUS Linnaeus, 1758

Delphinus delphis Linnaeus, 1758 (saddleback dolphin).

Widely distributed in warm temperate and tropical waters of all oceans, including the Black Sea. There is marked geographical variation in snout length and

other features; the extremely longsnouted Arabian Sea form, *D. d. tropicalis* van Bree, 1971, may be a distinct species (van Bree and Purves 1972).

Genus LAGENODELPHIS Fraser, 1956

Lagenodelphis hosei Fraser, 1956 (shortsnouted whitebelly dolphin).
Tropical and warm temperate waters of Indian and Pacific oceans. Recorded from Natal, Japan, Taiwan, Philippines, Borneo, northeastern Australia, and the central and eastern tropical Pacific.

Genus LAGENORHYNCHUS Gray, 1846

This genus contains two well-defined species in the North Atlantic and another in the North Pacific. Bierman and Slijper (1947, 1948) regarded all Southern Hemisphere forms as conspecific, but Fraser (1966) showed that there are three distinct species. The species *electra* is now placed in a separate genus, *Peponocephala*.

Lagenorhynchus albirostris (Gray, 1846) (whitebeak dolphin).
North Atlantic from Davis Strait and Newfoundland east to the Barents Sea and North Sea (rarely to the southern British Isles).

Lagenorhynchus acutus (Gray, 1828) (Atlantic whiteside dolphin).
North Atlantic from Massachusetts and southern Greenland east to western Norway and the British Isles.

Lagenorhynchus obliquidens Gill, 1865 (Pacific whiteside dolphin; hookfin dolphin).
Waters off the coast of North America from southeastern Alaska to Baja California, and off the coast of Asia from the Kuril Islands to Japan.

Lagenorhynchus obscurus (Gray, 1828) (dusky dolphin).
Temperate waters off South America, South Africa, Kerguélen Island, southern Australia, and New Zealand. Primarily a coastal species.

Lagenorhynchus australis (Peale, 1848) (blackchin dolphin).
Temperate waters off southern South America and the Falkland Islands.

Lagenorhynchus cruciger (Quoy and Gaimard, 1824) (hourglass dolphin).
Temperate waters of the Southern Ocean. A pelagic species, found chiefly in waters immediately north of the Antarctic Convergence.

Genus CEPHALORHYNCHUS Gray, 1846

Four species are recognized (Harmer 1922).

Cephalorhynchus commersonii (Lacépède, 1804) (piebald dolphin; Jacobite).
Atlantic coast of South America from Golfo San Matias to Tierra del Fuego; Falkland Islands; South Georgia; and Kerguélen Island.

Cephalorhynchus eutropia (Gray, 1846) (black dolphin; Chilean dolphin).
Coast of Chile between lat. 37° and 55°S.

Cephalorhynchus heavisidii (Gray, 1828).
Coastal waters from Cape of Good Hope north to Cape Cross, South West Africa (P. B. Best, pers. commun.).

Cephalorhynchus hectori (van Beneden, 1881) (pied dolphin; whitefront dolphin).
Coastal waters of New Zealand.

Genus LISSODELPHIS Gloger, 1841

The two species of this genus differ, as far as is known, mainly in color pattern, and they should perhaps be regarded as subspecies of a single species.

Lissodelphis borealis (Peale, 1848) (northern right-whale dolphin).
Temperate waters of the North Pacific from Japan and the Kurils to British Columbia and California. Individuals from Japan with a variant color pattern have been named *L. b. albiventris* Nishiwaki, 1972.

Lissodelphis peronii (Lacépède, 1804) (southern right-whale dolphin).
Temperate waters of the Southern Ocean.

Genus GRAMPUS Gray, 1828

Grampus griseus (G. Cuvier, 1812) (whitehead grampus; gray grampus).
All temperate and tropical seas.

Genus PEPONOCEPHALA Nishiwaki and Norris, 1966

Peponocephala electra (Gray, 1846) (little blackfish; many-toothed blackfish; melon-head blackfish).
Tropical Atlantic, Indian, and Pacific oceans.

Genus FERESA Gray, 1871

Feresa attenuata Gray, 1875 (pygmy killer whale).
Tropical and warm temperate waters of the Atlantic, Indian, and Pacific oceans.

Genus PSEUDORCA Reinhardt, 1862

Pseudorca crassidens (Owen, 1846) (false killer whale).
All temperate and tropical seas.

Genus GLOBICEPHALA Lesson, 1828

There appear to be two well-defined species, the ranges of which overlap off the middle Atlantic coast of the United States, off southern Europe, off South Africa, and perhaps elsewhere (van Bree 1971).

Globicephala melaena (Traill, 1809) (longfin pilot whale).
Nominate subspecies in the cool temperate North Atlantic Ocean; *G. m. edwardii* A. Smith, 1834, throughout cool temperate waters of the Southern Hemisphere. The validity of the subspecific distinction is questionable. Occurred in the North Pacific (near Japan) until at least the 10th century A.D. (Kasuya 1975).

Globicephala macrorhynchus Gray, 1846 (shortfin pilot whale).
Tropical and warm temperate waters of the Atlantic, Indian, and Pacific oceans. *Globicephala sieboldii* Gray, 1846, of the North Pacific is conspecific with *G. macrorhynchus*, although it may be recognizable at the subspecific level. (The specific name is usually spelled *macrorhyncha*, but it is a noun in apposition, not an adjective, so must retain its original gender.)

Genus ORCINUS Fitzinger, 1860

Orcinus orca (Linnaeus, 1758) (killer whale).
All oceans, chiefly in coastal waters and cooler regions.

Genus ORCAELLA Gray, 1866

Orcaella brevirostris (Gray, 1866) (Irrawaddy dolphin; lumbalumba).
Coastal waters from the Bay of Bengal east to New Guinea and northern Australia; ascends far up the Mekong, Irrawaddy, Ganges, and other rivers.

Genus PHOCOENA G. Cuvier, 1817

The genus includes four species (Norris and McFarland 1958; Noble and Fraser 1971).

Phocoena phocoena (Linnaeus, 1758) (harbor porpoise).
Coastal waters of the North Atlantic from Delaware and Sénégal north to Davis Strait, Iceland, and the White Sea; coastal waters of the North Pacific from Japan and Baja California north to Point Barrow, Alaska. An isolated population in the Black Sea has been named *P. p. relicta* Abel, 1905.

Phocoena sinus Norris and McFarland, 1958 (vaquita; cochito; Gulf of California porpoise).
Upper Gulf of California; sight records farther south are questionable.

Phocoena dioptrica Lahille, 1912 (spectacled porpoise).
Coast of Argentina and Uruguay; the Falkland Islands; and South Georgia.

Phocoena spinipinnis Burmeister, 1865 (black porpoise).
East coast of South America from Uruguay to Patagonia; west coast from Paita, Peru, to Valdivia, Chile.

Genus NEOPHOCAENA Palmer, 1899

Neophocaena phocaenoides (G. Cuvier, 1829) (finless porpoise).
Warm coastal waters and certain rivers from Pakistan east to Korea, Japan, Borneo, and Java. (The type-specimen allegedly came from the Cape of Good Hope, but Peter Best (pers. commun.) stated that there are no indisputable South African records.) Specimens from China and Japan differ from Indian Ocean specimens, and are best regarded as a subspecies, *N. p. asiaeorientalis* (Pilleri and Gihr, 1971), rather than a full species as originally described (van Bree 1973). More recently Pilleri and Gihr (1975) have differentiated three allopatric forms which they arbitrarily rank as species: *N. phocaenoides* from Pakistan to Borneo, *N. asiaeorientalis* from China, and *N. sunameri* Pilleri and Gihr, 1975, from Japan and Korea. Their published data are inadequate to reveal whether the Japanese and Chinese populations are sufficiently separable to warrant recognition of *sunameri* even as a subspecies.

Genus PHOCOENOIDES Andrews, 1911

Phocoenoides dallii (True, 1885) (Dall porpoise; whiteflank porpoise).
Immediate offshore waters of the North Pacific from Japan and southern California north to the southern Bering Sea. "True's porpoise" is a color phase localized in Japanese waters.

Family MONODONTIDAE

Some authors have included the narwhal and beluga in the family Delphinidae.

Genus DELPHINAPTERUS Lacépède, 1804

Delphinapterus leucas (Pallas, 1776) (beluga; belukha; white whale).
Arctic Ocean and adjacent seas; including Okhotsk and Bering Seas, and James Bay; isolated populations occur in Cook Inlet, Alaska, and the Gulf of St. Lawrence; ascends several hundred miles up larger rivers of Siberia and Alaska. Some authors recognize three subspecies: a large one, *D. l. dorofeevi*, Barabash and Klumov, 1935, from the

Okhotsk Sea; a small one, *D. l. marisalbi* Ostroumov, 1935, in the Barents and White seas; and a medium-sized one, *D. l. leucas*, in the rest of the range. However, geographical variation is more complex than this classification suggests (Sergeant and Brodie 1969).

Genus MONODON Linnaeus, 1758

Monodon monoceros Linnaeus, 1758 (Narwhal).
North polar seas, mainly in deep waters.

Family PHYSETERIDAE

The genus *Kogia* is sometimes placed in a separate family (Kogiidae).

Genus PHYSETER Linnaeus, 1758

Physeter macrocephalus Linnaeus, 1758 (sperm whale).
All oceans (except polar ice fields). (For use of this name instead of *P. catodon* Linnaeus, 1758, see Husson and Holthuis 1974.)

Genus KOGIA Gray, 1846

Handley (1966) has reviewed the distinguishing features of the two species in this genus.

Kogia breviceps (de Blainville, 1838) (pygmy sperm whale).
World-wide in tropical and warm temperate waters.

Kogia simus Owen, 1866 (dwarf sperm whale).
The seas adjacent to South Africa, India, Ceylon, Japan, Hawaii, California, Baja California, and eastern United States.

Family ZIPHIIDAE

See Moore (1968) for diagnoses of the genera.

Genus BERARDIUS Duvernoy, 1851

Two allopatric species are recognized. The North Pacific form differs from the Southern Hemisphere form chiefly by its much larger size. Possibly it should be regarded as only a subspecies of the Southern Hemisphere form.

Berardius arnuxii Duvernoy, 1851 (southern giant bottlenose whale).
Southern Ocean; known from South Australia, New Zealand, Argentina, Falkland Islands, South Georgia, South Shetlands, South Africa, and off the Antarctic Peninsula.

Berardius bairdii Stejneger, 1883 (North Pacific giant bottlenose whale).
North Pacific from Japan and southern California north to the Bering Sea.

Genus ZIPHIUS G. Cuvier, 1823

Ziphius cavirostris G. Cuvier, 1823 (goosebeak whale).
All temperate and tropical seas.

Genus TASMACETUS Oliver, 1937

Tasmacetus shepherdi Oliver, 1937.
Known only from a few specimens stranded in New Zealand, Chile, and Argentina.

Genus INDOPACETUS Moore, 1968

The one species of this genus was formerly included in *Mesoplodon*.

Indopacetus pacificus (Longman, 1926) (Indo-Pacific beaked whale).
Known from only two specimens stranded at Mackay, Queensland, Australia, and Danane, Somalia.

Genus HYPEROODON Lacépède, 1804

Two well-defined species are recognized: one in the North Atlantic, the other in the Southern Hemisphere. The latter constitutes subgenus *Frasercetus* Moore, 1968. The occurrence of *Hyperoodon* in the North Pacific has never been verified, and most if not all published records of its occurrence there are based on misidentification of *Berardius*. Beaked whales possibly referable to *Hyperoodon* are taken by whalers off the Okhotsk Sea coast of Hokkaido, but to date none has been examined by a biologist (M. Nishiwaki, pers. commun.).

Hyperoodon ampullatus (Forster, 1770) (North Atlantic bottlenose whale).
North Atlantic from Davis Strait and Novaya Zemlya south to Rhode Island and the English Channel; doubtfully recorded from the Mediterranean Sea.

Hyperoodon planifrons Flower, 1882 (flathead bottlenose whale).
Southern Ocean; known from Australia, New Zealand, Argentina, the Falkland Islands, South Georgia, the South Orkney Islands, South Africa, and off the coast of Antarctica in the Pacific and Indian Ocean sectors.

Genus MESOPLODON Gervais, 1850

Eleven species are currently recognized by Moore (1968). *Mesoplodon pacificus* is now placed in a separate genus, *Indopacetus*. *Mesoplodon layardii* is placed in the subgenus *Dolichodon* Gray, 1871; *M. densirostris* in the subgenus *Dioplodon* Gervais, 1850; and the remaining species are placed in subgenus *Mesoplodon*.

Mesoplodon hectori (Gray, 1871).
Known only from Tasmania, New Zealand, the Falkland Islands, and South Africa.

Mesoplodon mirus True, 1913.
North Atlantic from Florida and Nova Scotia east to the British Isles; an apparently isolated population in temperate waters off South Africa.

Mesoplodon europaeus (Gervais, 1855) (Antillean beaked whale; Gulf Stream beaked whale).
Western North Atlantic from Trinidad, Jamaica, and the Gulf of Mexico, to Long Island, N.Y.; one record from the English Channel.

Mesoplodon ginkgodens Nishiwaki and Kamiya, 1958 (ginkgo-tooth whale).
Recorded from Ceylon, Taiwan, Japan, and California.

Mesoplodon grayi von Haast, 1876 (scamperdown whale).
South Africa, South Australia, New Zealand, Chatham Islands, and Argentina; one record from the Netherlands.

Mesoplodon carlhubbsi Moore, 1963 (archbeak whale).
Temperate waters of the North Pacific from Japan east to British Columbia and California.

Mesoplodon bowdoini Andrews, 1908 (deepcrest whale).
Known only from New Zealand, Tasmania, Western Australia, Victoria, and Kerguélen Island.

Mesoplodon stejnegeri True, 1885 (sabertooth whale; Bering Sea beaked whale).
Subarctic waters of the North Pacific from the Bering Sea south to Japan and Oregon.

Mesoplodon bidens (Sowerby, 1804) (North Sea beaked whale).
Cool temperate waters of the North Atlantic from Newfoundland and Massachusetts east to southern Norway and the Bay of Biscay.

Mesoplodon layardii (Gray, 1865) (straptooth whale).
South Africa, southern Australia, New Zealand, and the Falkland Islands.

Mesoplodon densirostris (de Blainville, 1817) (dense-beak whale; tropical beaked whale).
Tropical and warm temperate waters of all oceans.

SYNONYMS

Listed below are generic and specific synonyms frequently appearing in recent literature.

In recent literature	In present list
Arctocephalus doriferus	*Arctocephalus pusillus*
A. elegans	*A. tropicalis*
A. tasmanicus	*A. pusillus*
Arctophoca	*Arctocephalus*
Balaena australis	*Balaena glacialis*
B. japonica	*B. glacialis*
B. sieboldii	*B. glacialis*
Balaenoptera bonaerensis	*Balaenoptera acutorostrata*
B. brydei	*B. edeni*
B. davidsoni	*B. acutorostrata*
B. huttoni	*B. acutorostrata*
Callorhinus alascensis	*Callorhinus ursinus*
C. curilensis	*C. ursinus*
C. cynocephalus	*C. ursinus*
C. mimicus	*C. ursinus*
Cephalorhynchus albifrons	*Cephalorhynchus hectori*
C. albiventris	*C. eutropia*
Delphinapterus dorofeevi	*Delphinapterus leucas*
D. friemani	*D. leucas*
Delphinus bairdii	*Delphinus delphis*
D. capensis	*D. delphis*
D. dussumieri	*D. delphis*
D. longirostris	*D. delphis*
D. roseiventris	*Stenella longirostris*
D. tropicalis	*Delphinus delphis*
Electra	*Peponocephala*
Eschrichtius gibbosus	*Eschrichtius robustus*
E. glaucus	*E. robustus*
Eubalaena	*Balaena*
Eumetopias stellerii	*Eumetopias jubatus*
Feresa intermedia	*Feresa attenuata*
F. occulta	*F. attenuata*
Globicephala brachyptera	*Globicephala macrorhynchus*
G. edwardii	*G. melaena*
G. leucosagmaphora	*G. melaena*
G. scammonii	*G. macrorhynchus*
G. sieboldii	*G. macrorhynchus*
Grampidelphis	*Grampus*
Grampus orca	*Orcinus orca*
G. rectipinna	*O. orca*
Gypsophoca	*Arctocephalus*
Histriophoca	*Phoca*
Hydrodamalis stelleri	*Hydrodamalis gigas*
Hyperoodon rostratus	*Hyperoodon ampullatus*
Lagenorhynchus electra	*Peponocephala electra*
L. fitzroyi	*Lagenorhynchus obscurus*
L. ognevi	*L. obliquidens*
L. superciliosus	*L. obscurus*
L. thicolea	*Lagenorhynchus* sp.?
L. wilsoni	*L. cruciger*
Megaptera nodosa	*Megaptera novaeangliae*
Meomeris	*Neophocaena*
Mesoplodon gervaisi	*Mesoplodon europaeus*
M. hotaula	*M. gingkodens*
M. pacificus	*Indopacetus pacificus*

Monachus albiventer	*Monachus monachus*
Neobalaena	*Caperea*
Neomeris	*Neophocaena*
Neophoca hookeri	*Phocarctos hookeri*
N. lobatus	*Neophoca cinerea*
Nodus	*Mesoplodon*
Odobenus divergens	*Odobenus rosmarus*
Orcaella fluminalis	*Orcaella brevirostris*
Orcella	*Orcaella*
Orcinus rectipinna	*Orcinus orca*
Otaria byronia	*Otaria flavescens*
Pagophilus	*Phoca*
Phoca insularis	*Phoca vitulina*
P. kurilensis	*P. vitulina*
P. richardii	*P. vitulina*
Phocoena vomerina	*Phocoena phocoena*
Phocoenoides truei	*Phocoenoides dallii*
Physeter catodon	*Physeter macrocephalus*
Platanista indi	*Platanista minor*
Prodelphinus	*Stenella*
Pusa	*Phoca*
Rhachianectes	*Eschrichtius*
Rhytina	*Hydrodamalis*
Sibbaldus	*Balaenoptera*
Sotalia borneensis	*Sousa chinensis*
S. brasiliensis	*Sotalia fluviatilis*
S. chinensis	*Sousa chinensis*
S. gadamu	*Tursiops truncatus*
S. guianensis	*Sotalia fluviatilis*
S. lentiginosa	*Sousa chinensis*
S. pallida	*Sotalia fluviatilis*
S. plumbea	*Sousa chinensis*
S. sinensis	*S. chinensis*
S. teuszii	*S. teuszii*
S. tucuxi	*Sotalia fluviatilis*
Sousa borneensis	*Sousa chinensis*
S. lentiginosa	*S. chinensis*
S. plumbea	*S. chinensis*
S. queenslandensis	*S. chinensis*
Stenella alope	*Stenella longirostris*
S. dubia	*Stenella* (?) *attenuata*
S. euphrosyne	*S. coeruleoalba*
S. frontalis	*Stenella* (?) *attenuata*
S. graffmani	*S. attenuata*
S. malayana	*Sousa chinensis* (fide van Bree, pers. commun.)
S. microps	*Stenella longirostris*
S. pernettensis	*Stenella* (?) *plagiodon*
S. roseiventris	*S. longirostris*
S. styx	*S. coeruleoalba*
Steno rostratus	*Steno bredanensis*
Stenodelphis	*Pontoporia*
Stenorhinchus	*Hydrurga*
Stenorhynchus	*Hydrurga*
Susu	*Platanista*
Thalarctos	*Ursus*
Trichechus latirostris	*Trichechus manatus*
Tursiops abusalum	*Tursiops truncatus*
T. aduncus	*T. truncatus*
T. catalania	*T. truncatus*
T. gadamu	*T. truncatus*
T. gillii	*T. truncatus*
T. nesarnack	*T. truncatus*
T. nuuanu	*T. truncatus*
Zalophus cinereus	*Neophoca cinerea*
Z. japonicus	*Zalophus californianus*
Z. lobatus	*Neophoca cinerea*
Z. wollebaeki	*Zalophus californianus*

ACKNOWLEDGMENTS

Victor B. Scheffer, coauthor of the previous two editions, reviewed the entire manuscript. P. J. H. van Bree and C. A. Repenning reviewed in detail the sections on cetaceans and pinnipeds, respectively. P. B. Best, W. F. Perrin, and P. D. Shaughnessy provided valuable comments on portions of the manuscript.

LITERATURE CITED

ALLEN, J. A.
1908. The North Atlantic right whale and its near allies.. Bull. Am. Mus. Nat. Hist. 24:277-329.

AMERICAN ORNITHOLOGISTS' UNION, COMMITTEE ON CLASSIFICATION AND NOMENCLATURE.
1973. Thirty-second supplement to the American Ornithologists' Union check-list of North American birds. Auk 90:411-419.

ANDERSON, S., and J. K. JONES, JR. (editors).
1967. Recent mammals of the world; a synopsis of families. Ronald Press, N.Y., 453 p.

BAILEY, R. M., J. E. FITCH, E. S. HERALD, E. A. LACHNER, C. C. LINDSEY, C. R. ROBINS, and W. B. SCOTT.
1970 A list of common and scientific names of fishes from the United States and Canada. Am. Fish. Soc. Spec. Publ. 6, 150 p.

BELKIN, A. N.
1964. A new species of seal, *Phoca insularis* sp. n., from the Kuril Islands. Dokl. Akad. Nauk SSSR 158:1217-1219. (In Russ. Transl. seen, Dokl. Biol. Sci., 1965, 158:756-758.)

BERZIN, A. A., E. A. TIKHOMIROV, and V. I. TROININ.
1963. Izchezla li Stellerova korova? (Is the Steller sea cow really extinct?) [In Russ.] Priroda 52(8):73-75.

BIERMAN, W. H., and E. J. SLIJPER.
1947. Remarks upon the species of the genus *Lagenorhynchus*. I. Kon. Ned. Akad. Wetensch., Amsterdam, Afd. Natuur. 50:1353-1364.
1948. Remarks upon the species of the genus *Lagenorhynchus*. II. Kon. Ned. Akad. Wetensch., Amsterdam, Afd. Natuur. 51:127-133.

BURNS, J. J.
1970. Remarks on the distribution and natural history of pagophilic pinnipeds in the Bering and Chukchi Seas. J. Mammal. 51:445-454.

BURNS, J. J., and F. H. FAY.
1970. Comparative morphology of the skull of the ribbon seal, *Histriophoca fasciata*, with remarks on systematics of Phocidae.. J. Zool. 161:363-394.

CARTER, T. D., J. E. HILL, and G. H. H. TATE.
1945. Mammals of the Pacific world. Macmillan Co., N.Y., 227 p.

DAVIS, J., and W. Z. LIDICKER, JR.
1975. The taxonomic status of the southern sea otter. Proc. Calif. Acad. Sci., Ser. 4, 40:429-437.

DOUTT, J. K.
1942. A review of the genus *Phoca*. Ann. Carnegie Mus. 29:61-125.

ESCHRICHT, D. F., and J. REINHARDT.
1861. Om Nordhvalen (*Balaena mysticetus* L). Vidensk. Selsk. Skr., 5 Raekke, Naturvidensk. Mathem. Afd. 5:433-592.

FLOWER, W. H.
1883. On the characters and divisions of the family Delphinidae. Proc. Zool. Soc. Lond. 1883:466-513.

FRASER, F. C.
1966. Comments on the Delphinoidea. *In* K. S. Norris (editor), Whales, dolphins, and porpoises, p. 7-31. Univ. Calif. Press, Berkeley and Los Ang.

FRASER, F. C., and B. A. NOBLE.
1970. Variation of pigmentation pattern in Meyen's dolphin, *Stenella coeruleoalba* (Meyen). *In* G. Pilleri (editor), Investigations on Cetacea, Vol. II, p. 147-163. Inst. Brain Anat., Berne, Switz.

FRASER, F. C., and P. E. PURVES.
1960. Hearing in cetaceans. Evolution of the accessory air sacs and the structure and function of the outer and middle ear in Recent cetaceans. Bull. Br. Mus. (Nat. Hist.) Zool. 7:1-140.

GARD, L. M., JR., G. E. LEWIS, and F. C. WHITMORE, JR.
1972. Steller's sea cow in Pleistocene interglacial beach deposits on Amchitka, Aleutian Islands. Geol. Soc. Am., Bull. 83:867-870.

HANDLEY, C. O., JR.
1966. A synopsis of the genus *Kogia* (pygmy sperm whales). *In* K. S. Norris (editor), Whales, dolphins, and porpoises, p. 62-69. Univ. Calif. Press, Berkeley and Los Ang.

HARMER, S. F.
1922. On Commerson's dolphin and other species of *Cephalorhynchus*. Proc. Zool. Soc. Lond., 1922:627-638.

HATT, R. T.
1934. A manatee collected by the American Museum Congo Expedition, with observations on the Recent manatees. Bull. Am. Mus. Nat. Hist. 66:533-566.

HENDEY, Q. B.
1972. A Pliocene ursid from South Africa. Ann. S. Afr. Mus. 59: 115-132.

HERSHKOVITZ, P.
1966. Catalog of living whales. U.S. Natl. Mus. Bull. 246, 259 p.

HUSSON, A. M., and L. B. HOLTHUIS.
1974. *Physeter macrocephalus* Linnaeus, 1758, the valid name for the sperm whale. Zool. Meded. 48:205-217.

ICHIHARA, T.
1966. The pygmy blue whale, *Balaenoptera musculus brevicauda*, a new subspecies from the Antarctic. *In* K. S. Norris (editor), Whales, dolphins, and porpoises, p. 79-113. Univ. Calif. Press, Berkeley and Los Ang.

INTERNATIONAL TRUST FOR ZOOLOGICAL NOMENCLATURE.
1964. International code of zoological nomenclature *adopted by the* XV International Congress of Zoology. [In Engl. and French.] Int. Trust Zool. Nomen., Lond., 176 p.

INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES.
1972. Red data book. Vol. 1: *Mammalia*. Int. Union Conserv. Nat. Natur. Resour., Morges, Switz.

INTERNATIONAL WHALING COMMISSION, SUBCOMMITTEE ON SMALL CETACEANS.
1975. Report of the meeting on smaller cetaceans: Montreal, April 1-11, 1974. J. Fish. Res. Board Can. 32:889-983.

JONES, R. E.
1967. A *Hydrodamalis* skull fragment from Monterey Bay, California. J. Mammal. 48:143-144.

KASUYA, T.
1972. Some informations on the growth of the Ganges dolphin with a comment on the Indus dolphin. Sci. Rep. Whales Res. Inst. 24: 87-108.
1973. Systematic consideration of Recent toothed whales based on the morphology of tympano-periotic bone. Sci. Rep. Whales Res. Inst. 25:1-103.
1975. Past occurrence of *Globicephala melaena* in the western North Pacific. Sci. Rep. Whales Res. Inst. 27:95-110.

KELLOGG, R.
1928. The history of whales—their adaptation to life in the water. Q. Rev. Biol. 3:29-76, 174-208.
1936. A review of the Archaeoceti. Carnegie Inst. Wash. Publ. 482, 366 p.

KHUZIN, R. SH.
1963. Materialy po morfologicheskoi kharakteristike trekh stad grenlandskogo tyulenya *Pagophilus groenlandicus* Erxl. 1777. Polyar. Nauchn.-Issled. Proekt. Inst. Morsk. Rybn. Khoz. Okeanogr., Murmansk, Materialy Rybokhoz. Issled. Severn. Basseina, Sbornik 1:51-54.
1967. Izmechivost'kranologicheskikh priznakov groendlanskogo tyulenya (Variability of the craniological features of the harp seal *Pagophilus groenlandicus* (Erxleben)). Tr. Polyar. Nauchn.-Issled. Proekt. Inst. Morsk, Rybn. Khoz Okeanogr. 21:27-50. (In Russ. Transl. Fish. Res. Board Can., Transl. Ser. 1306, 1969, 41 p.)

KING, J. E.
1960. Sea-lions of the genera *Neophoca* and *Phocarctos*. Mammalia 24:445-456.
1964. Seals of the world. Br. Mus. (Nat. Hist.), Lond., 154 p.

KLEINENBERG, S. E.
1958. On the origin of Cetacea. Proc. 15th Int. Congr. Zool., p. 445-447.

KOSYGIN, G. M., and V. A. POTELOV.
1971. Vozrastnaya, polovaya i populyatsionnaya izmenchivost'kraniologicheskikh prznakov morskogo zaitsa (Age, sex and population variability of the craniological characters of bearded seals). Tr. Vses. Nauchn.-Issled. Inst. Rybn. Khoz. Okeanogr. 82:266-288. (In Russ. Transl. Fish. Res. Board Can., Transl. Ser. 2651, 1973, 29 p.)

LYDEKKER, R.
1909. On the skull-characters in the southern sea-elephant. Proc. Zool. Soc. Lond. 1909:600-606.

McLAREN, I. A.
1966. Taxonomy of harbor seals of the western North Pacific and evolution of certain other hair seals. J. Mammal. 47:466-473.

MANSFIELD, A. W.
1967. Distribution of the harbor seal, *Phoca vitulina* Linnaeus, in Canadian arctic waters. J. Mammal. 48:249-257.

MATTHES, H. W.
1962. Verbreitung der Säugetiere in der Vorzeit. *In* Handbuch der Zool., Band 8, Lief. 28, 11(1):1-198. Walter de Gruyter & Co., Berl.

MILLER, G. S., JR.
1923. The telescoping of the cetacean skull. Smithson. Misc. Collect. 76(5):1-72.

MITCHELL, E. D.
1975. Parallelism and convergence in the evolution of Otariidae and Phocidae. Rapp. P.-V. Réun. Cons. Int. Explor. Mer 169:12-26.

MITCHELL, E., and R. H. TEDFORD.
1973. The Enaliarctinae a new group of extinct aquatic Carnivora and a consideration of the origin of the Otariidae. Bull. Am. Mus. Nat. Hist. 151:201-284.

MOORE, J. C.
1968. Relationships among the living genera of beaked whales with classifications, diagnoses and keys. Fieldiana:Zool. 53:209-298.

MORRELL, B.
1832. A narrative of four voyages to the south sea, north and south Pacific Ocean, Chinese sea, Ethiopic and southern Atlantic Ocean, Indian and Antarctic Ocean. From the year 1822 to 1831. J. & J. Harper, N.Y., 492 p.

MULLER, J.
1954. Observations on the orbital region of the skull of the Mysticoceti. Zool. Meded. 32:279-290.

MURIE, O. J.
1959. Fauna of the Aleutian Islands and Alaska Peninsula. U.S. Fish Wildl. Serv., North Am. Fauna 61, p. 1-364.

NISHIWAKI, M.
1963. Taxonomical consideration on genera of *Delphinidae*. Sci. Rep. Whales Res. Inst. 17:93-104.
1973. Status of the Japanese sea lion. Int. Union Conserv. Nat. Natur. Resour. IUCN Publ., New Ser., Suppl. Pap. 39:80-81.

NOBLE, B. A., and F. C. FRASER.
1971. Description of a skeleton and supplementary notes on the skull of a rare porpoise *Phocoena sinus* Norris & McFarland 1958. J. Nat. Hist. 5:447-464.

NORRIS, K. S., and W. N. McFARLAND.
1958. A new harbor porpoise of the genus *Phocoena* from the Gulf of California. J. Mammal. 39:22-39.

OMURA, H.
1975. Osteological study of the minke whale from the Antarctic. Sci. Rep. Whales Res. Inst. 27:1-36.
OMURA, H., S. OHSUMI, T. NEMOTO, K. NASU, and T. KASUYA.
1969. Black right whales in the North Pacific. Sci. Rep. Whales Res. Inst. 21:1-78.
PERRIN, W. F.
1970. Color pattern of the eastern Pacific spotted porpoise *Stenella graffmani* Lönnberg (Cetacea, Delphinidae). Zoologica (N.Y.) 54:135-149.
1972. Color patterns of spinner porpoises (*Stenella* cf. *S. longirostris*) of the eastern Pacific and Hawaii, with comments on delphinid pigmentation. Fish. Bull., U.S. 70:983-1003.
1975a. Distribution and differentiation of populations of dolphins of the genus *Stenella* in the eastern tropical Pacific. J. Fish. Res. Board Can. 32:1059-1067.
1975b. Variation of spotted and spinner porpoise (Genus *Stenella*) in the eastern Pacific and Hawaii. Bull. Scripps Inst. Oceanogr., Univ. Calif. 21:1-206.
PILLERI, G., and M. GIHR.
1971. Differences observed in the skulls of *Plantanista indi* and *gangetica*. *In* G. Pilleri (editor), Investigations on Cetacea, Vol. 3, Part 1, p. 13-21. Inst. Brain Anat., Berne, Switz.
1975. On the taxonomy and ecology of the finless black porpoise, *Neophocoena* (Cetacea, Delphinidae). Mammalia 39:657-673.
PIVETEAU, J. (editor).
1958. Traité de paléontologie. Tome 6, Vol. 2, 962 p. Masson, Paris.
1961. Traité de paléontologie. Tome 6, Vol. 1, 1138 p. Masson, Paris.
REINHART, R. H.
1959. A review of the Sirenia and Desmostylia. Univ. Calif. Publ. Geol. Sci. 36:1-146.
REPENNING, C. A.
1975. Otarioid evolution. Rapp. P.-V. Réun. Cons. Int. Explor. Mer 169:27-33.
REPENNING, C. A., R. S. PETERSON, and C. L. HUBBS.
1971. Contributions to the systematics of the southern fur seals, with particular reference to the Juan Fernández and Guadalupe species. Antarct. Res. Ser. 18:1-34.
RICE, D. W., and V. B. SCHEFFER.
1968. A list of the marine mammals of the world. U.S. Fish Wildl. Serv., Spec. Sci. Rep. Fish. 579, 16 p.
ROEST, A. I.
1973. Subspecies of the sea otter, *Enhydra lutris*. Los Ang. Cty. Mus., Contrib. Sci. 252:1-17.
ROMER, A. S.
1966. Vertebrate paleontology. 3d ed. Univ. Chicago Press, Chicago, 468 p.
SCHEFFER, V. B.
1958. Seals, sea lions, and walruses; a review of the Pinnipedia. Stanford Univ. Press, Stanford, 179 p.
SCHEFFER, V. B., and D. W. RICE.
1963. A list of the marine mammals of the world. U.S. Fish Wildl. Serv., Spec. Sci. Rep. Fish. 431, 12 p.
SERGEANT, D. E., and P. F. BRODIE.
1969. Body size in white whales, *Delphinapterus leucas*. J. Fish. Res. Board Can. 26:2561-2580.
SHAUGHNESSY, P. D.
1974. Biochemical identification of populations of the harbor seal, *Phoca vitulina*. Ph.D. Thesis, University of Alaska, Fairbanks, 179 p.
SIMPSON, G. G.
1945. The principles of classification and a classification of mammals. Bull. Am. Mus. Nat. Hist. 85:1-350.
1961. Principles of animal taxonomy. Columbia Univ. Press, N.Y., 247 p.
SLIJPER, E. J.
1936. Die Cetaceen. Capita Zool. 7:1-590.
SMIRNOV, N.
1927. Diagnostical remarks about seals (Phocidae) of the Northern Hemisphere. Tromsø. Mus. Årsh. 48(5):1-23.
STEJNEGER, L.
1897. The Russian fur-seal islands. U.S. Fish Comm. Bull. for 1896, 16:1-148.
1898. The Asiatic fur-seal islands and fur-seal industry. *In* D. S. Jordan (editor), The fur seals and fur-seal islands of the North Pacific Ocean, part 4, 384 p. Government Printing Office, Wash., D.C.
TRUE, F. W.
1889. Contributions to the natural history of the cetaceans, a review of the family Delphinidae. Bull. U.S. Natl. Mus. 36, 192 p.
U.S. MARINE MAMMAL COMMISSION.
1976. Marine mammal names used by the Marine Mammal Commission. Wash., D.C., 8 p.
van BREE, P. J. H.
1971. On *Globicephala sieboldii* Gray, 1846, and other species of pilot whales. Beaufortia 19:79-87.
1973. *Neophocaena phocaenoides asiaeorientalis* (Pilleri & Gihr, 1973), a synonym of the preoccupied name *Delphinus melas* Schlegel, 1841. Beaufortia 21:17-24.
van BREE, P. J. H., and P. E. PURVES.
1972. Remarks on the validity of *Delphinus bairdii* (Cetacea, Delphinidae). J. Mammal. 53:372-374.
van BREE, P. J. H., and D. ROBINEAU.
1973. Notes sur les holotypes de *Inia geoffrensis geoffrensis* (de Blainville, 1817) et de *Inia geoffrensis boliviensis* d'Orbigny, 1834 (Cetacea, Platanistidae). Mammalia 37:658-668.
VAZ FERREIRA, R.
1976. *Arctocephalus australis* (Zimmerman), South American fur seal. Adv. Comm. Mar. Resour. Res., Sci. Consult. Mamm. 49: 1-13.
WINGE, H.
1921. A review of the interrelationships of the Cetacea. Smithson. Misc. Collect. 72(8):1-97.
YABLOKOV, A. V., and V. YA. ETIN.
1965. Analysis of population differences in the body coloring of mammals (as exemplified by the harp seal, *Phoca groenlandica*). [In Russ., Engl. summ.] Zool. Zh. 44:1103-1106.
YABLOKOV, A. V., and D. E. SERGEANT.
1963. Cranial variations in the harp seal (*Pagophilus groenlandicus* Erxleben, 1777). Zool. Zh. 42:1857-1865. (In Russ., Can. State Bur. Transl. No. 3908, 1964, 16 p.)
ZEMSKY, V. A., and V. A. BORONIN.
1964. On the question of the pygmy blue whale taxonomic position. Nor. Hvalfangst-Tidsskr. 53:306-311.

★ GPO : 1978 O - 257-902

672. Seasonal occurrence of young Gulf menhaden and other fishes in a northwestern Florida estuary. By Marlin E. Tagatz and E. Peter H. Wilkins. August 1973, iii + 14 p., 1 fig., 4 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

673. Abundance and distribution of inshore benthic fauna off southwestern Long Island, N.Y. By Frank W. Steimle, Jr. and Richard B. Stone. December 1973, iii + 50 p., 2 figs., 5 app. tables.

674. Lake Erie bottom trawl explorations, 1962-66. By Edgar W. Bowman. January 1974, iv + 21 p., 9 figs., 1 table, 7 app. tables.

675. Proceedings of the International Billfish Symposium, Kailua-Kona, Hawaii, 9-12 August 1972. Part 1. Report of the Symposium. March 1975, iii + 33 p.; Part 2. Review and contributed papers. July 1974, iv + 355 p. (38 papers); Part 3. Species synopses. June 1975, iii + 159 p. (8 papers). Richard S. Shomura and Francis Williams (editors). For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

676. Price spreads and cost analyses for finfish and shellfish products at different marketing levels. By Erwin S. Penn. March 1974, vi + 74 p., 15 figs., 12 tables, 12 app. figs., 14 app. tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

677. Abundance of benthic macroinvertebrates in natural and altered estuarine areas. By Gill Gilmore and Lee Trent. April 1974, iii + 13 p., 11 figs., 3 tables, 2 app. tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

678. Distribution, abundance, and growth of juvenile sockeye salmon, *Oncorhynchus nerka*, and associated species in the Naknek River system, 1961-64. By Robert J. Ellis. September 1974, v + 53 p., 27 figs., 26 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

679. Kinds and abundance of zooplankton collected by the USCG icebreaker *Glacier* in the eastern Chukchi Sea, September-October 1970. By Bruce L. Wing. August 1974, iv + 18 p., 14 figs., 6 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

680. Pelagic amphipod crustaceans from the southeastern Bering Sea, June 1971. By Gerald A. Sanger. July 1974, iii + 8 p., 3 figs., 3 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

681. Physiological response of the cunner, *Tautogolabrus adspersus*, to cadmium. October 1974, iv + 33 p., 6 papers, various authors. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

682. Heat exchange between ocean and atmosphere in the eastern North Pacific for 1961-71. By N. E. Clark, L. Eber, R. M. Laurs, J. A. Renner, and J. F. T. Saur. December 1974, iii + 108 p., 2 figs., 1 table, 5 plates.

683. Bioeconomic relationships for the Maine lobster fishery with consideration of alternative management schemes. By Robert L. Dow, Frederick W. Bell, and Donald M. Harriman. March 1975, v + 44 p., 20 figs., 25 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

684. Age and size composition of the Atlantic menhaden, *Brevoortia tyrannus*, purse seine catch, 1963-71, with a brief discussion of the fishery. By William R. Nicholson. June 1975, iv + 28 p., 1 fig., 12 tables, 18 app. tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

685. An annotated list of larval and juvenile fishes captured with surface-towed meter net in the South Atlantic Bight during four RV *Dolphin* cruises between May 1967 and February 1968. By Michael P. Fahay. March 1975, iv + 39 p., 19 figs., 9 tables, 1 app. table. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

686. Pink salmon, *Oncorhynchus gorbuscha*, tagging experiments in southeastern Alaska, 1938-42 and 1945. By Roy E. Nakatani, Gerald J. Paulik, and Richard Van Cleve. April 1975, iv + 39 p., 24 figs., 16 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

687. Annotated bibliography on the biology of the menhadens, Genus *Brevoortia*, 1963-1973. By John W. Reintjes and Peggy M. Kenev. April 1975, 92 p. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

688. Effect of gas supersaturated Columbia River water on the survival of juvenile chinook and coho salmon. By Theodore H. Blahm, Robert J. McConnell, and George R. Snyder. April 1975, iii + 22 p., 8 figs., 5 tables, 4 app. tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

689. Ocean distribution of stocks of Pacific salmon, *Oncorhynchus* spp., and steelhead trout, *Salmo gairdneri*, as shown by tagging experiments. Charts of tag recoveries by Canada, Japan, and the United States, 1956-69. By Robert R. French, Richard G. Bakkala, and Doyle F. Sutherland. June 1975, viii + 89 p., 117 figs., 2 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

690. Migratory routes of adult sockeye salmon, *Oncorhynchus nerka*, in the eastern Bering Sea and Bristol Bay. By Richard R. Straty. April 1975, iv + 32 p., 22 figs., 3 tables, 3 app. tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

691. Seasonal distributions of larval flatfishes (Pleuronectiformes) on the continental shelf between Cape Cod, Massachusetts, and Cape Lookout, North Carolina, 1965-66. By W. G. Smith, J. D. Sibunka, and A. Wells. June 1975, iv + 68 p., 72 figs., 16 tables.

692. Expendable bathythermograph observations from the NMFS/MARAD Ship of Opportunity Program for 1972. By Steven K. Cook. June 1975, iv + 81 p., 81 figs. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

693. Daily and 4-weekly upwelling indices, west coast of North America, 1967-73. By Andrew Bakun. August 1975, iii + 114 p., 3 figs., 6 tables.

694. Semiclosed seawater system with automatic salinity, temperature and turbidity control. By Sid Korn. September 1975, iii + 5 p., 7 figs., 1 table.

695. Distribution, relative abundance, and movement of skipjack tuna, *Katsuwonus pelamis*, in the Pacific Ocean based on Japanese tuna long-line catches, 1964-67. By Walter M. Matsumoto. October 1975, iii + 30 p., 15 figs., 4 tables.

696. Large-scale air-sea interactions at ocean weather station V, 1961-71. By David M. Husby and Gunter R. Seckel. November 1975, iv + 44 p., 11 figs., 4 tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

697. Fish and hydrographic collections made by the research vessels *Dolphin* and *Delaware II* during 1968-72 from New York to Florida. By S. J. Wilk and M. J. Silverman. January 1976, iii + 159 p., 1 table, 2 app. tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

698. Summer benthic fish fauna of Sandy Hook Bay, New Jersey. By Stuart J. Wilk and Myron J. Silverman. January 1976, iv + 16 p., 21 figs., 1 table, 2 app. tables. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

699. Seasonal surface currents off the coasts of Vancouver Island and Washington as shown by drift bottle experiments, 1964-65. By W. James Ingraham, Jr. and James R. Hastings. May 1976, iii + 9 p., 4 figs., 4 tables.